Livestock Nutrition Update

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GROWING Opportunities

Prepared by Manitoba Agriculture, Food and Rural Initiatives.

Manitoba

CANOLA MEAL REPLACES CORN DDGS IN LACTATING DAIRY COW DIETS

Source: C.N. Mulrooney, D.J. Schingoethe, K.F. Kalscheur and A.R. Hippen. Canola meal replacing dried distillers grains with solubles in lactating dairy cow diets. Midwest Animal Science/Dairy Science, Des Moines, IA. March 15-17, 2008. Reprinted, in part, with permission of authors.

Objective: To determine the response of lactating dairy cows to diets containing canola meal as a protein supplement in place of all or portions of distillers grains with solubles (DDGS).

The continual growth of the ethanol industry has resulted in large quantities of byproducts to be available for livestock feeding, such as dry distillers grains with solubles (DDGS). The canola industry wants to know if canola meal can be a competing protein or co-protein source with DDGS. Unlike DDGS and other corn-based products, which is limiting in Lysine, canola meal is one of the highest biological value vegetable protein supplements available. When it comes to rumen degradability, the protein in DDGS may degrade less rapidly than desired and the protein in canola meal may degrade more rapidly in the rumen than desired for optimal protein utilization (Piepenbrink and Schingoethe (1998). Thus, some combination of the two protein sources may be optimal for milk protein production.

The four diets were: canola meal as the source of supplemental protein (**CM**), 2/3 canola meal and 1/3 DDGS as the source of supplemental protein (**2/3CM**), 1/3 canola meal and 2/3 DDGS as the source of supplemental protein (**1/3CM**) and DDGS as the source of supplemental protein (**DDGS**).

Twelve lactating Holstein cows were fed individually using the Calan feeding system. Cows were assigned to one of 4 experimental diets in a replicated 4 x 4 Latin square experiment, with 4 wk periods. Forages were premixed for all the diets constituting 55% of the total diet DM. Diets were fed to allow for ad libitum consumption.

Canola meal, dry distillers grains with solubles, and combinations of the two protein supplements were equally effective in supporting milk production. Canola meal in diets did not significantly affect dry matter intake, milk production, milk composition, feed intake, BW, or BCS.

	Diet			
	CM	2/3 CM	1/3 CM	DDGS
Milk, kg/d	35.18	35.84	34.51	34.31
DMI, kg/d	25.24	25.41	25.94	25.10
Fat, %	3.81	4.05	3.97	3.87
Protein, %	3.05	3.06	3.06	3.01
FE	1.46	1.53	1.42	1.44

Varying concentrations of DDGS had a cubic effect on acetate, propionate and butyrate production as well as a linear effect on butyrate. Although, with numbers so close, it's a question whether there is any biological significance.

Because production was similar whether fed canola meal, dry distillers grains with solubles, or combinations of CM and DDGS as the protein supplement, canola meal is a suitable protein source. This is good news for the canola industry, showing that canola meal can be used as a successful byproduct in dairy cow diets.

Feeding High Proportions of Barley Grain Stimulates an Inflammatory Response in Dairy Cows

Source: J. Dairy Sci. 91:606-614. 2008. D. G. V. Emmanual, S. M. Dunn and B. N. Ametaj.

A study was conducted at the University of Alberta to determine the effects of feeding high levels of barley on endotoxin (LPS) production and the inflammatory response in dairy cows. Barley has a high level of readily fermentable carbohydrate (ie starch) which can be fermented by rumen microbes to provide energy to the animal. However, excess readily fermentable carbohydrate is known to decrease rumen pH, and result in increased incidence of metabolic problems such as acidosis, displaced abomasums and bloat. The exact mechanism for this is not entirely clear but appears to be related to the production of endotoxin when diets high in starch are fed.

High grain diets have been shown to result in increased levels of endotoxin in rumen fluid and potential transfer into the bloodstream. Fever and altered metabolism are several of the symptoms seen during the acute phase response. Endotoxins cause the cows to initiate a strong immune response. The immune response involves the production of various compounds that assist in rendering the endotoxins harmless. They are serum amyloid A (SAA), LPS-binding protein (LBP), haptoglobin and C-reactive protein (CRP). The objective of this study was to determine the effects of feeding varying levels of barley on both endotoxin levels in rumen fluid and plasma levels of the above 4 compounds involved in immune response.

Lactating Holstein cows were fed diets with 0, 15, 30 or 45% rolled barley, on a DM basis, in the TMR. All diets contained similar concentrations of protein and energy. NFC (nonfibre carbohydrate) levels were 35.4, 38.8, 42.1 and 45.5%, respectively, with increasing barley. Dry matter intakes were similar for cows fed 15, 30 and 45% barley and lowest for cows fed no barley. Cows fed 45% barley produced the most milk (31 kg/d). Cows fed 15 and 30% barley produced similar amounts of milk (about 28.6kg/d) while cows fed no barley produced the least amount of milk (27 kg/d). Rumen pH decreased with increasing barley concentration. The amount of ruminal fluid endotoxin was highest in cows fed 30 and 45% barley. No difference in endotoxin concentration was noted between cows fed 0 and 15% barley. The higher plasma concentrations of SAA, LBP and CRP in cows fed 30 and 45% barley indicated the endotoxins did stimulate a strong immune response. No difference in plasma haptoglobin levels were noted among treatments.

The authors concluded that high grain diets did initiate an immune response in the cows and that more research is needed to fully understand the mechanism(s) by which it occurs.

NUTRITION TIPS FOR THE NEW PHOSPHORUS ECONOMY

Source: Robyn Harte, Swine Specialist, MAFRI

New regulations exist in the Province of Manitoba regarding the land based calculations for manure spreading. Historically, regulations relied on nitrogen but now phosphorus (P) is the new key. Due to this switch in manure management, what goes into the pig needs to be re-evaluated in order to reduce what comes out.

However, due to high feedstuff prices and low hog prices many producers are worried about making sure the feed truck comes next week never mind whether or not the P in their hog rations is being overfed. But with the cost of inorganic P as a feed input and, increasingly as an output, it is important to limit P in your hog rations. In this light it makes fiscal and environmental sense to examine the P in your rations.

One way to reduce the amount of P in a ration is to discuss how much P is in your rations with a nutritionist. Are you overfeeding P to your pigs? In 2001, Kornegay and Verstegen[1] reported data from surveys conducted from the early 1980's until the mid 1990's stating that P was overfed at 110-155% of requirement stated in NRC (1998). That is a lot of wasted P! Talking to your nutritionist ensures that your P is at the required level for your pigs' optimal performance.

Another way to reduce P in your rations is to phase feed. While it sounds costly up front, the closer to the animals' requirement you feed the less waste of all nutrients including P occurs and less nutrient waste is less money waste. Over time your pigs' requirements change and their diet should reflect those changes. Dritz et al. (1997) reported that there could be as much as a 12.5% decrease in the amount of P consumed and excreted when a three- phase program was used versus a one-phase program.

Phytase is a valuable tool for reducing the amount of P in your pig rations. Phytase is an enzyme, added to feed, that aids in the digestion of P that is unavailable (Phytate P) in most feedstuffs. Phytate P cannot be digested by pigs and by adding Phytase to the ration this unavailable P is made more available. Phytase acts in the stomach (it needs an acidic environment to work) to breakdown the bonds that hold the phytate P. Once the P is liberated it travels into the intestine where it can then be absorbed and utilized. It is important to remember when using Phytase that you must reduce your inorganic P inclusion otherwise your pigs will not excrete less P (and more of the P that will be excreted will be bio-available, that is bad for the environment) than before. Depending upon how much Phytase you are using in your rations will determine by how much you will need to reduce your inorganic P.

Phosphorus Reduction Check-list

- Talk to nutritionist about P levels in rations
- Determine if you need an extra phase or two
- Use Phytase and lower your added inorganic P

For more information or to answer any questions please contact your local GO team office or the Livestock knowledge Centre.

1. *Kornegay, E.T., and M. W. A. Verstegen. 2001. Swine nutrition and environmental pollution and odor control. Page 609 in Swine Nutrition. A. J. Lewis and L. L. Southern, ed. CRC Press, Boca Raton, FL.*
2. *Dritz, S. S., M. D. Tokach, R. D. Goodband, and J. L. Nelssen. 1997. Growing-finishing pig recommendations. Available: http://www.oznet.ksu.edu/library/lvstk2/mf2301.pdf.*

GRASS FED BEEF – AN ARGENTINEAN EXPERIENCE

Source: Juanita Kopp, Farm Production Extention Specialist – Beef, MAFRI

Juanita was one of eight delegates of the 'Argentina Grass-Fed Beef Technology Transfer Mission' (March 1 – 11, 2008). The project was initiated by the Manitoba Grass Fed Beef Association, funded by the Manitoba Functional Food Opportunities Program and supported by Manitoba Agriculture, Food and Rural Initiatives.

Grass Fed Beef –An Argentinean Experience

Argentina is synonymous with grass fed beef; they would rarely use grain to finish their cattle. But times are changing, due to high grain prices most of the ranches we visited were going to rip up pastures and plant soybeans, followed by sunflowers or corn. But the Argentinean culture is dependant on beef. About 3.1 million tons of beef is produced per year (6 billion pounds) and most of it is consumed in the domestic market.

Pasture Management

The campo managers or owners send the cow herds south or west to the poorer lands, where native ranges are prevalent. After the calves are weaned they send them back to the more fertile lands of the Pampas, there they will be backgrounded and later finished. Stocking densities were quoted as kg per ha and the average weight of stocker cattle is 300 kg and the stocking density is 1100 kg/ha or about 3.5 head/ha. To increase their stocking rates in the Pampa region, and to free up more land for annual crops, they supplement the cattle with cracked corn, sunflower pellets, hay and or silage at a rate of 0.5 to 1% of body weight.

Gains on Pasture

Attentive graziers monitor their cattle gains throughout the summer to see when the cattle gains are lower and subsequently find ways to manage the late summer slump and fall pasture quality decline. Most of the pastures we toured were alfalfa-grass pastures, but the cattle also grazed corn, sorghum and annual crops. The farm managers targeted average day gains of 600 to 800 g/hd/day or more. Dry matter intake on lush alfalfa-grass pastures can be a problem, to offset this they fed good quality hay to increase the DMI of the cattle with in turn increases their ADG.

To optimize animal gains, the amount of soluble carbohydrates (SCH) and crude protein (CP) need to be balanced. Dr. Anibal Pordomingo, a beef researcher with INTA (National Institute of Agricultural Technology, Anguil, Argentina), stated that the SCH content of forages is very important for animal gain. Evaluating forages only by measuring the % ADF and % TDN is not the most accurate way of predicting animal performance.

Protein is required by the rumen microbes to grow; the microbial protein that is produced in the rumen later provides protein to the animal. Nitrogen is quickly released in the rumen after it is consumed; therefore the presence of an easily digested carbohydrate (SCH) is needed by the microbes to capture the nitrogen. The greater the SCH content the better the match with protein supply and the greater the chances of capturing the nitrogen for microbial growth. The closer the protein to SCH ratio is to 1:1 the better the potential gains.

In a presentation that Dr. Pordomingo gave at the 2006 Manitoba Grazing School, the following table describes the idea forage chemical composition needed to achieve high individual animal gains

Desired composition of green forages for high individual cattle gains

Nutritional Components	Values	Nutritional Components	Values
Dry Matter, %	Above 20	ADF, %	Below 25
Crude Protein, %	Range from 14 to 18	In vitro Digestibility, %	Above 65
Soluble Carbohydrates, %	Above 18	Dry Matter Intake, % live weight	Above 2.5
CP:SCH	Similar or below 1	Metabolizable Energy Concentration, MCal/kg DM	Above 2.4
NDF, %	Below 40		

Adapted from the Proceedings from the Manitoba Grazing School 2006, Nov. 29 & 30, 2006, Keystone Centre, Brandon, Manitoba.

Poisonous Plants on Pasture

Many common weeds are potentially harmful to livestock. The following list includes eleven of the weeds I have been asked about over the last several years. This list is not meant to be all inclusive or entirely representative of problems across Manitoba. Many excellent references (all with pictures) are available in both printed format and online. These are listed at the end of the article.

Water Hemlock (Cicuta maculata)
Toxin: cicutoxin
Poisonous Part of Plant: Entire plant, particularly rootstock and roots.
Symptoms: Onset of symptoms within 15-60 minutes. Salivation, vomiting, severe spasms and convulsions, death by asphyxiation.
Comments: Considered to be highly toxic. Lethal doses: 0.1 kg of fresh plant material for sheep, 0.4 kg of fresh plant material for cattle (Canadian Poisonous Plants Information System)

Common Vetch (Vicia sativa)
Toxin: beta-cyano-L-alanine. A cyanogenic glycoside which, in the presence of enzymes in plant or digestive tract, may release hydrocyanic acid.
Poisonous Part of Plant: Primarily seeds, also foliage
Symptoms: Similar to cyanide poisoning. Difficulty breathing, restlessness, convulsions, coma, death.
Comments: Concentrations of glycosides and enzymes vary depending upon the species, variety and life cycle stage.

Lupines (Lupinus spp)
Toxin: Poisonous alkaloids
Poisonous Part of Plant: Primarily seeds, reports of leaves being poisonous
Symptoms: Labored breathing, convulsions, death. Deformed calves born to cows that consumed plant during 40-70 days gestation.
Comments: Sheep may be more susceptible than cattle. Deaths have been reported when livestock, especially sheep, consumed 0.25% of their body weight of pods.

Lambsquarters (Chenopodium album)
Toxin: Oxalates, nitrates
Poisonous Part of Plant: Leaves, stem
Symptoms: Nitrate Poisoning (labored breathing, diarrhea, death), oxalates (yellow, pigmented skin, recumbency, unconsciousness)
Comments: Most poisonings are due to oxalates. Poisonings of cattle, horses, sheep, swine and humans have been reported.

Redroot Pigweed (Amaranthus retroflexus)
Toxin: nitrates, oxalates
Poisonous Part of Plant: Leaves, stem
Symptoms: Labored breathing, bloat, death
Comments: Poisoning of cattle and swine has been reported.

Cockle (Agrostemma githago, Saponaria spp.)
Names: Purple cockle, cow cockle bouncingbet
Toxin: Saponins.
Poisonous Part of Plant: Seeds
Symptoms: Vomiting, diarrhea, restlessness, teeth grinding, rapid breathing, coma, death
Comments: Palatability of seeds is considered poor (feed refusal is high). Poisonings have been reported in many animals including poultry, horses, cattle and rabbits.

Black nightshade (Solanum spp.)
Toxin: Alkaloids
Poisonous Part of Plant: All parts of the plant contain alkaloids, however, the highest concentrations are found in the green, immature berries. Alkaloid concentration increases in the leaves until plant maturity. Once berries become mature (ripe, black) they contain very little alkaloids.
Symptoms: Abdominal pain, pupil dilation, diarrhea, loss of coordination, unconsciousness, death.
Comments: Dried plants remain toxic. Poisonings have been reported in cattle, sheep, horses, swine, poultry and humans.

Chokecherries (Prunus virginiana)
Toxin: Cyanogenic glycosides (hydrogen cyanide)
Poisonous Part of Plant: Leaves (at all stages of growth), seeds, twigs.
Symptoms: agitation, staggering, convulsions, death by asphyxiation.
Comments: Toxicity may be increased in re-growth after dry periods or frost. Fresh leaves, consumed at 0.25% of an animal's body weight, has been shown to be lethal in cattle.

Larkspur (Delphinium spp.)
Toxin: The alkaloid methyllycaconitine
Poisonous Part of Plant: Seeds, leaves
Symptoms: Bloat, weakness, paralysis, death from asphyxiation
Comments: Highly poisonous to cattle but less so for horses and sheep (reason unknown). Larkspur is palatable. There is less chance of poisoning after seeds have dispersed although the seeds do remain poisonous.

Horsetail (Equisetum arvense)
Toxin: thiaminase
Poisonous Parts of Plants: Leaves, stems
Symptoms: Thiamine deficiency especially in horses. Scours, paralysis, death.
Comments: Affects primarily horses but poisoning of cattle has been reported. Hay with more than 20% foxtail may induce thiamine deficiency in horses in 2-5 weeks.

Leafy Spurge (Euphorbia esula)
Toxin: Ingenol derivatives (strong irritants)
Poisonous Parts of Plants: Latex within stem.
Symptoms: Contact with latex causes skin irritation/inflammation. Consumption causes diarrhea, vomiting, abdominal pain, muscle tremors.
Comments: Leafy spurge is considered toxic to cattle but can be consumed by sheep and goats.

Sources:
Canadian Poisonous Plants Information System. http://www.cbif.gc.ca/pls/pp/poison?p_x=px
Common Poisonous Plants and Mushrooms of North America. Turner and Szczawinski. 1991. 311 pgs.
Weeds of Nebraska and the Great Plains. Nebraska Department of Agriculture. 1995. 589pgs.

Other References:
http://www.ansci.cornell.edu/plants/index.html
http://vet.purdue.edu/depts/addl/toxic/cover1.htm
http://cal.nbc.upenn.edu/poison/